

Evaluation of seed and in-furrow treatments for control of Rhizoctonia stem canker and black scurf of potato, 2012.

Russet Burbank seed potatoes were prepared for planting by cutting and treating with fungicidal seed treatments 7 days prior to planting. Seed was cut on 9 May 2012 and planted on 16 May 2012. The field plots at the Aberdeen Research and Extension Center were prepared for the trial by inoculation with *Rhizoctonia*-infected barley. Organic barley seed (free of any pesticides) was autoclaved in spawn bags and then inoculated with *Rhizoctonia solani* AG3. The *Rhizoctonia* was then allowed to colonize the autoclaved barley for 3 weeks after which time the bags were opened and placed in trays to dry for 3-4 days. The infected barley was then ground in a blender in preparation for inoculation of the field plots. Field plots were inoculated using a fertilizer spreader and mixed into the soil during planting. Fields (except for untreated, non-inoculated control plots) were inoculated on 15 May. Seed pieces were planted on 16 May into 2-row x 25 ft-long plots (ca. 12 in. between plants to give a target population of 50 plants at 36 in. row spacing) replicated four times in a randomized complete block design. Treatment rows were separated by 5 ft-long empty (plant free) plots. Dust formulation seed treatments were measured and added to cut seed pieces in a revolving drum seed treater, and mixed for 2 min to ensure even spread of the fungicide. Fungicides applied as a pre-planting liquid seed treatment were applied in a water suspension at a rate of 0.2 pt/cwt onto the exposed seed tuber surface, with the entire seed surface coated in a plastic rotating cement mixer for 1 minute. In-furrow applications were made over the seed at planting, applied with a single nozzle R&D spray boom delivering 15 gal/A (30 p.s.i) and using one XR8001VS nozzle/row. Fertilizer (220 units P₂O₅ + 10 units Zn + 5 units Mn + 110 units N) was drilled into plots before planting, formulated according to the results of soil tests. Additional nitrogen (10-34 at 40lb/A) was applied to the growing crop with irrigation based on the results of petiole sampling which was carried out periodically during the growing season. Insecticide (Admire, 16.9 oz/A) was applied at hilling on 29 May. Weeds were controlled with herbicide (1.5 oz/A Matrix + 0.67 lb/A Sencor) which was applied post planting on 5 June. Vines were killed with Reglone 2EC on 18 September.

Emergence was rated as the number of plants breaking the soil surface or fully emerged after planting. The rate of emergence was estimated as the relative area-under-the-plant-emergence-curve (RAUEPC, with a maximum value of 100) from the day of planting until approximately 31 days after planting. Destructive sampling of 5 plants per plot was carried out on 18 July and 15 August with plants being rated for vigor, *Rhizoctonia* stem canker, the number of diseased stolons and tuber number per plant. The severity of *Rhizoctonia* stem canker was measured as an index calculated by counting the number of stems per plant (n=5 plants) falling in class 0 = 0%; 1 = less than 10% of stem covered in *Rhizoctonia* lesions; 2 = 11 - 25% of stem covered in *Rhizoctonia* lesions; 3 = 26 - 50% of stem covered in *Rhizoctonia* lesions; 4 = *Rhizoctonia* lesion girdled the stem; 5 = stem completely cut off. The number in each class is multiplied by the class number and summed. The sum is multiplied by a constant (equal to the total number of stems evaluated) to express as a percentage disease severity index. Indices of 0 - 25 cover the range of 0 - 10%, 26 - 50 cover the range 11 - 25%, 51 - 60 cover the range 26 - 50%, and > 61 cover the range of 51 - 100% *Rhizoctonia* stem canker. Tubers were harvested starting on 5 October and graded on 7 November. At grading, samples of 50 tubers/plot were retained and incubated at 50°F until 8 January 2013 at which time they were rated for black scurf incidence and severity.

There were no adverse weather conditions after planting and before emergence that may have affected the rate of emergence of the plants. There were no significant differences in the rate of emergence (RAUEPC) and final plant stand among all treatments and the untreated and inoculated checks. At the first destructive sampling on 18 July there were no significant differences in disease incidence, severity and tuber number among any of the treatments and the inoculated check. At the second destructive sampling on 15 August there were no significant differences in disease incidence and tuber number among treatments and the inoculated check. However, there were significant differences in disease severity among several treatments and the inoculated check. Treatments with a severity index between 37.1 and 45.2 percent had significantly lower disease severity than the inoculated check. There were no significant differences in yield among all the treatments and the inoculated check. In the ratings for black scurf, treatments with less than 81 percent black scurf incidence were significantly different to the inoculated check. Treatments with less than 22.9 percent black scurf severity were significantly different to the inoculated check.

Number	Treatment and rate (application timing) ^z	Emergence (%) ^y		18 July ratings				15 August ratings				Total Yield (cwt/a)		Postharvest black scurf	
				Shoot disease rating (1-100)	Stolen Severity (%)	Shoot disease rating (1-100)	Stolen Severity (%)	Shoot disease rating (1-100)	Stolen Severity (%)	Shoot disease rating (1-100)	Stolen Severity (%)			Incidence (%)	Severity (%)
1	Maxim MZ DS 0.5 lb/cwt (A)	80.0	a ^x	31.5	ab	24.8	ab	57.1	abc	23.2	a	249.4	a	92.0	abc
2	Quadris SC 8.7 fl oz/a (B)	84.5	a	25.5	ab	14.8	ab	42.8	cd	18.5	a	293.5	a	82.0	abcd
3	Maxim MZ DS 0.5 lb/cwt (A); Quadris SC 8.7 fl oz/a (B)	83.5	a	6.2	b	6.0	b	51.5	abcd	20.3	a	291.8	a	86.0	abcd
4	Priaxor SC 8 fl oz/a (B)	78.5	a	40.7	a	11.3	ab	43.9	cd	13.8	a	311.8	a	93.0	ab
5	Vertisan EC 10.2 fl oz/a (B)	74.5	a	17.7	ab	10.5	ab	40.1	cd	22.3	a	319.5	a	85.0	abcd
6	Vertisan EC 23.2 fl oz/a (B)	79.5	a	36.0	ab	35.7	a	40.0	cd	22.5	a	295.2	a	81.0	bcd
7	Fontelis SC 0.3 fl oz/cwt + Manzate FL 0.9 fl oz/cwt (A)	83.5	a	19.0	ab	18.5	ab	47.2	abcd	18.7	a	231.6	a	81.0	bcd
8	Fontelis SC 0.3 fl oz/cwt + Manzate FL 0.9 fl oz/cwt (A); Vertisan EC 16.7 fl oz/a (B)	86.0	a	11.2	ab	18.7	ab	37.1	d	13.6	a	247.0	a	76.0	d
9	Fontelis SC 0.3 fl oz/cwt + Manzate FL 0.9 fl oz/cwt (A); Vertisan EC 1 pt/a (C)	80.0	a	16.0	ab	15.2	ab	45.2	bcd	20.6	a	222.1	a	87.0	abcd
10	Vydate C-LV L 4.2 pt/a (B)	78.5	a	37.0	ab	10.2	ab	64.2	ab	26.0	a	285.6	a	91.0	abcd
11	Serenade Soil SC 2 qt/a (B)	85.0	a	29.2	ab	17.4	ab	47.1	abcd	21.8	a	254.2	a	83.0	abcd
12	Serenade Soil SC 1 qt/a + Quadris SC 6 fl oz/a (B)	88.5	a	21.5	ab	19.2	ab	43.9	cd	21.3	a	301.7	a	87.0	abcd
13	Serenade Soil SC 2 qt/a + Quadris SC 6 fl oz/a (B)	84.0	a	29.2	ab	11.8	ab	42.2	cd	17.2	a	279.1	a	77.0	cd
14	Serenade Soil SC 1 qt/a + Quadris SC 8.7 fl oz/a (B)	88.0	a	21.9	ab	13.5	ab	56.7	abc	28.9	a	307.2	a	84.0	abcd
15	Serenade Soil SC 1 qt/a + Moncut 70DF 0.75 lb/a (B)	76.5	a	16.9	ab	5.9	b	52.2	abcd	20.3	a	237.9	a	94.0	ab
16	Serenade Soil SC 1 qt/a + Biotam WP 1.4 lb/a (B)	77.5	a	27.3	ab	17.0	ab	56.7	abc	21.2	a	263.1	a	83.0	abcd
17	Untreated control	84.5	a	9.6	ab	5.9	b	38.0	cd	19.7	a	323.0	a	80.0	bcd
18	Inoculated control	89.5	a	38.5	ab	15.9	ab	64.9	a	21.2	a	358.8	a	97.0	a
Tukey's HSD _{0.05}		21.15		32.84		26.72		19.55		28.57		211.64		15.59	12.08

^zApplication dates: A, seed treatments = 10 May; B, in-furrow at planting application = 16 May; C, foliar spray targeting stem base = 9 July

^yFinal emergence count taken on 22 June.

^xValues followed by the same letter are not significantly different at $p = 0.05$ (Tukey's HSD).